Industrial Strength Encoding

Workflow Automation for QuickTime

Session 729

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Introduction

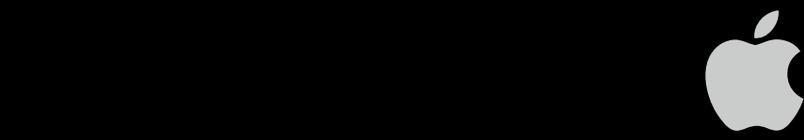
- What is Industrial Strength Encoding?
  - Converting large amounts of media to QuickTime
  - Doing it as fast as possible with compromising quality
- What does it entail?
  - Workflow design
  - Hardware configuration
  - Network topology
  - Software automation
- Who needs it?
  - Anyone with a high volume of traditional media assets

What You'll Learn

- Workflow process and design
  - How to plan your project
- Video capture and encoding
  - Selecting and configuring the right hardware and software
  - Setting up a network suitable for digital video
  - Compression settings for QuickTime MPEG-4
  - Automating a workflow with AppleScript
- Content management
  - Creating an online database and asset review system
  - Batch-managing the publishing of your content

Case Study—WWDC 2003 Encoding

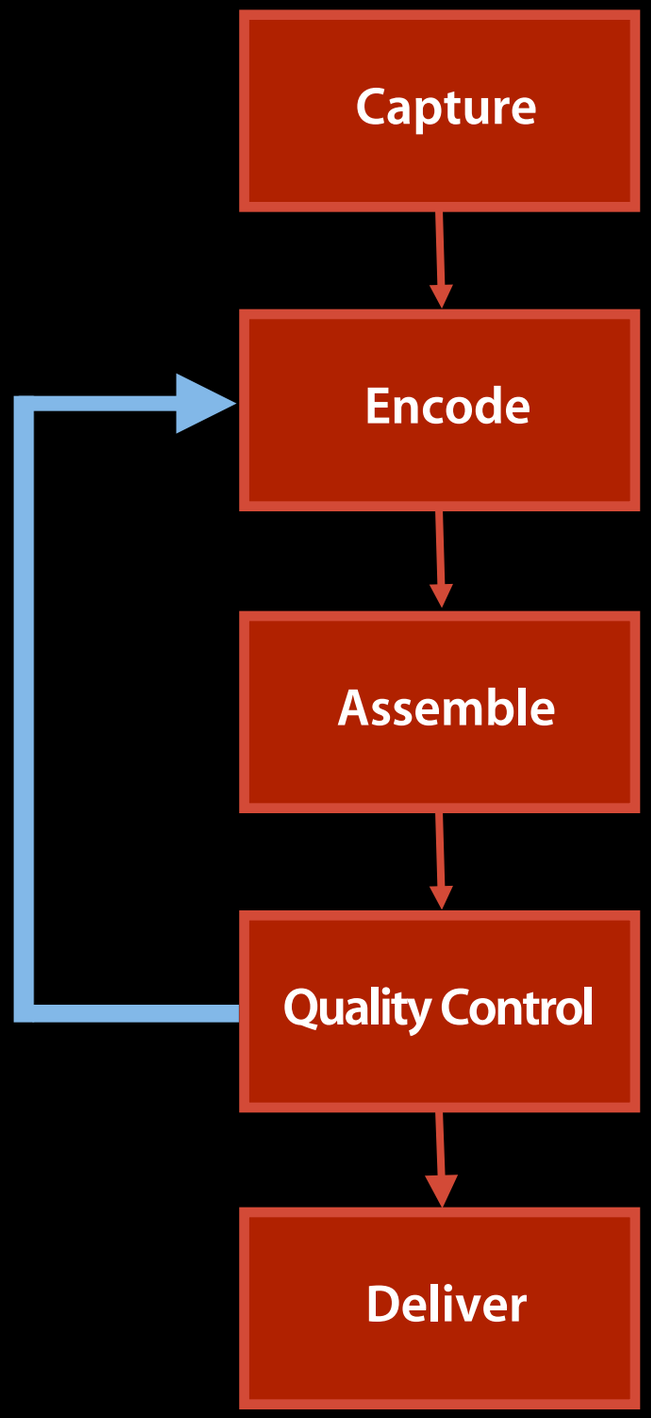
- 170+ sessions, over 200 hours of source material
- Dual language (English and Japanese)
- Encode for streaming for low and mid broadband
- Encode for DVD-ROM
- DVCAM source (with dual language tracks)
- Compress to MPEG-4
- Mac OSX automated workflow
- Assemble in multi-language versions



Workflow Process

WWDC 2003

- Capture
  - Digitize from DVCAM
- Encode
  - Compress at multiple rates
- Assemble
  - Combine language versions
- Quality control
  - Review encodes online
- Deliver
  - Push to streaming server



Workflow Design—Challenges

- How long is this going to take?
  - Calculate set up and capture times per source clip
  - Calculate encoding times per bit rate, per machine
  - Estimate the number of CPUs you need to meet deadline
  - Decide how fast your network needs to be
- Do you have enough storage space?
  - Digitized input and encoded output
- Can manual processes be automated to save time and effort?
  - Are my applications scriptable?
- How can the final output be easily reviewed for approval?
  - Build a web-based review system accessible from anywhere

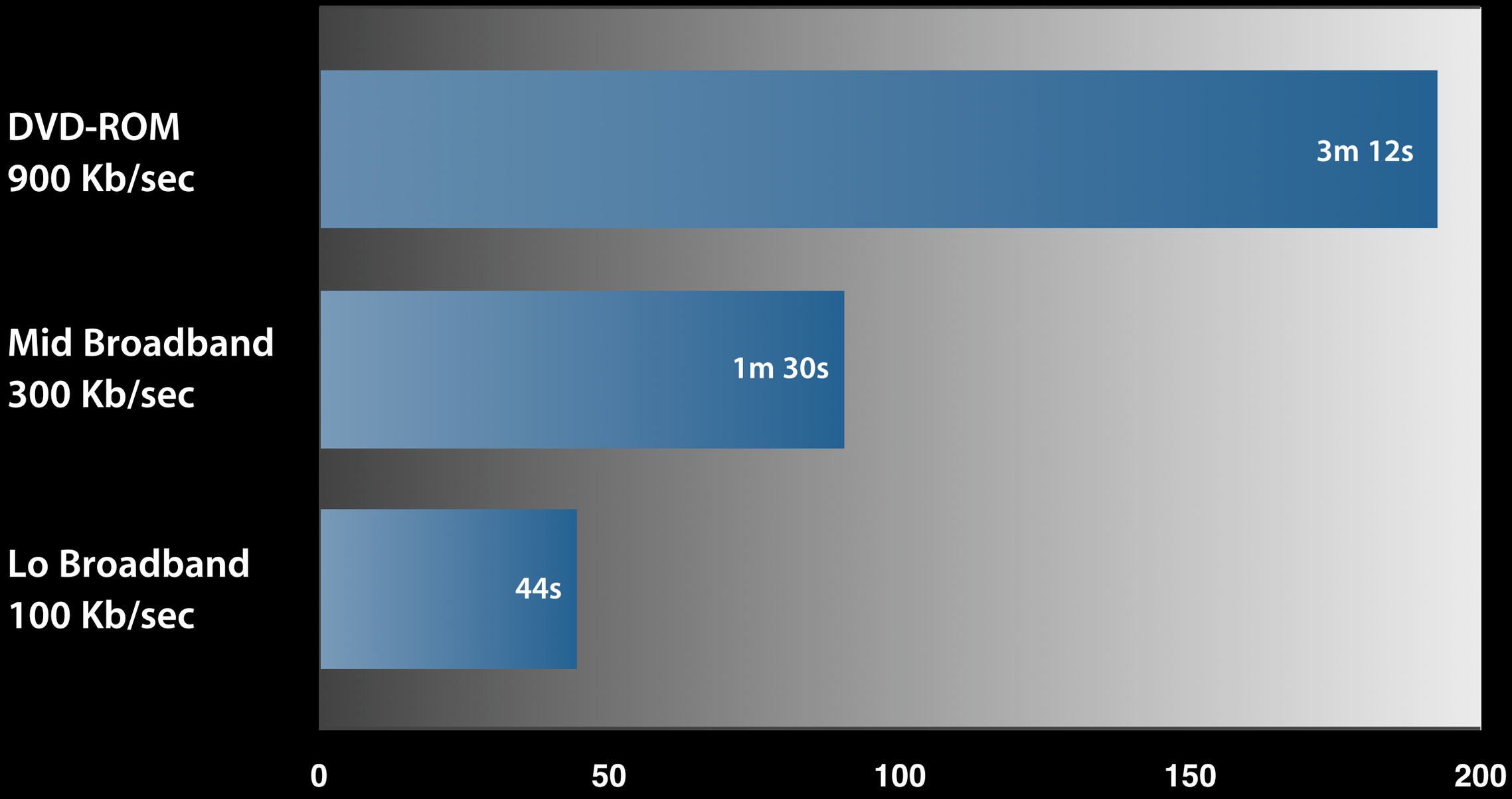
Workflow Mathematics

Capture

- Storage metrics
  - DVCAM 720x480 @ 29.97 fps (NTSC)
  - 3.5 MB/sec x 200 hours = ~ 2.52 TB of online storage
- Digitizing metrics
  - Session length average = 65 minutes
  - Set-up time = ~ 5 minutes
  - Total average time to capture session = ~ 70 minutes
- Overall production metrics
  - Digitizing 171 sessions takes 12,000 machine minutes
  - Load split across four capture stations = 50 hours

Workflow Mathematics

Encode to MPEG-4 (per source minute, dual 1.33 GHz G4 Xserve)



Workflow Mathematics

Encode to MPEG-4

- Compression metrics
  - Average encode time per session = 5h 53m
- Overall production metrics
  - Encoding 171 sessions takes 1,006 machine hours (42 days)
  - Load split across 20 encoding stations = 50 hours
- Reality check!
  - Post-production (editing, etc.) restricts flow of source content
  - Review and approve process takes further time
  - Realistically, allowing for hiccups, 2 weeks is achievable

Workflow Mathematics

Assembly

- Project requires:
  - English language movies @ 100 and 300 Kb/sec
  - Japanese language movies @ 100 and 300 Kb/sec
  - Combined English and Japanese movies @ 900 Kb/sec (DVD)
- Strategy:
  - Encode Japanese audio separately
  - Replace English audio with Japanese, save as duplicate
  - Combine J and E in DVD version and use language alternates
  - Script the whole process in QuickTime Player Pro
  - If fully automated, assembly time is insignificant (seconds)

The Work Unit

Capture configuration

Sony DSR-25

FireWire

Dual 1.33 GHz Xserve

2Gb Fiber

1.2TB side of Xserve RAID

- What's on the DVCAM tape:
  - Video; English audio (Ch.1); Japanese audio (Ch.2)
- What's on the Xserve:
  - QuickTime 6.3
  - Final Cut Pro 4

Workflow Process

Capture and export

- Establish naming convention for files
- Digitize video and both audio channels from DVCAM
- Export video with English audio by reference
  - Example: 729_e.mov
- Export Japanese audio (no video)
  - Example: 729_j.mov

The Work Unit

Capture and encode configuration (one unit)

Sony DSR-25

FireWire

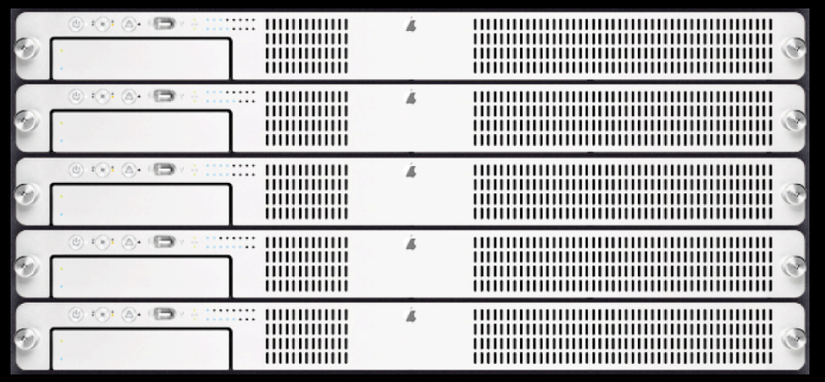
Gig E

Dual 1.33 GHz Xserve

2Gb Fiber

1.2TB side of Xserve RAID

Asanté GX5-2400



5 x Dual 1.33 GHz Xserve cluster

What's on the clusters:

Discreet Cleaner 6

Whistle Blower 3.1 client

Encoding Settings

QuickTime MPEG-4

- Lo Broadband (100 Kb/sec)
  - Suitable for dual ISDN connections or faster
  - 256x192, 7.5 fps, RTSP streaming
- Mid Broadband (300 Kb/sec)
  - Suitable for 384 Kb DSL or cable connections
  - 320x240, 15 fps, RTSP streaming
- DVD-ROM (900 Kb/sec)
  - Bit rate chosen to give high quality while limiting file size
  - 400x300, 29.97 fps, local playback from DVD-ROM

Demo

Discreet Cleaner 6

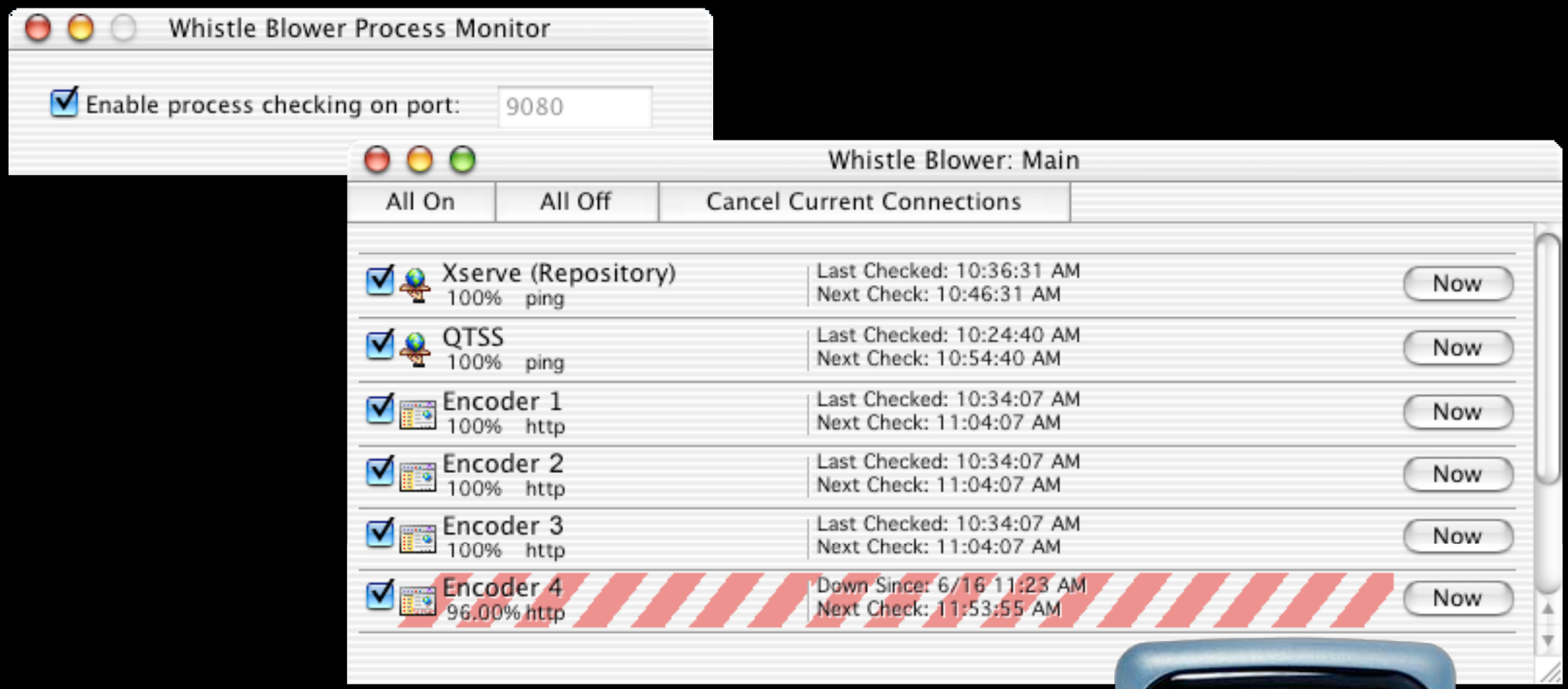
Encoding Process

Automation via Watch Folders

- Exports from capture machines
  - Dropped manually into a cascading folder process
  - Same source is encoded in all bit rates unattended
  - Encoded files are ‘pushed’ to central repository
- ‘Headless’ process
  - No need to monitor encoders
  - Whistle Blower will report to pager if cleaner crashes
  - Encoders can be controlled with Apple Remote Desktop
  - General encoder health can be observed with Server Status

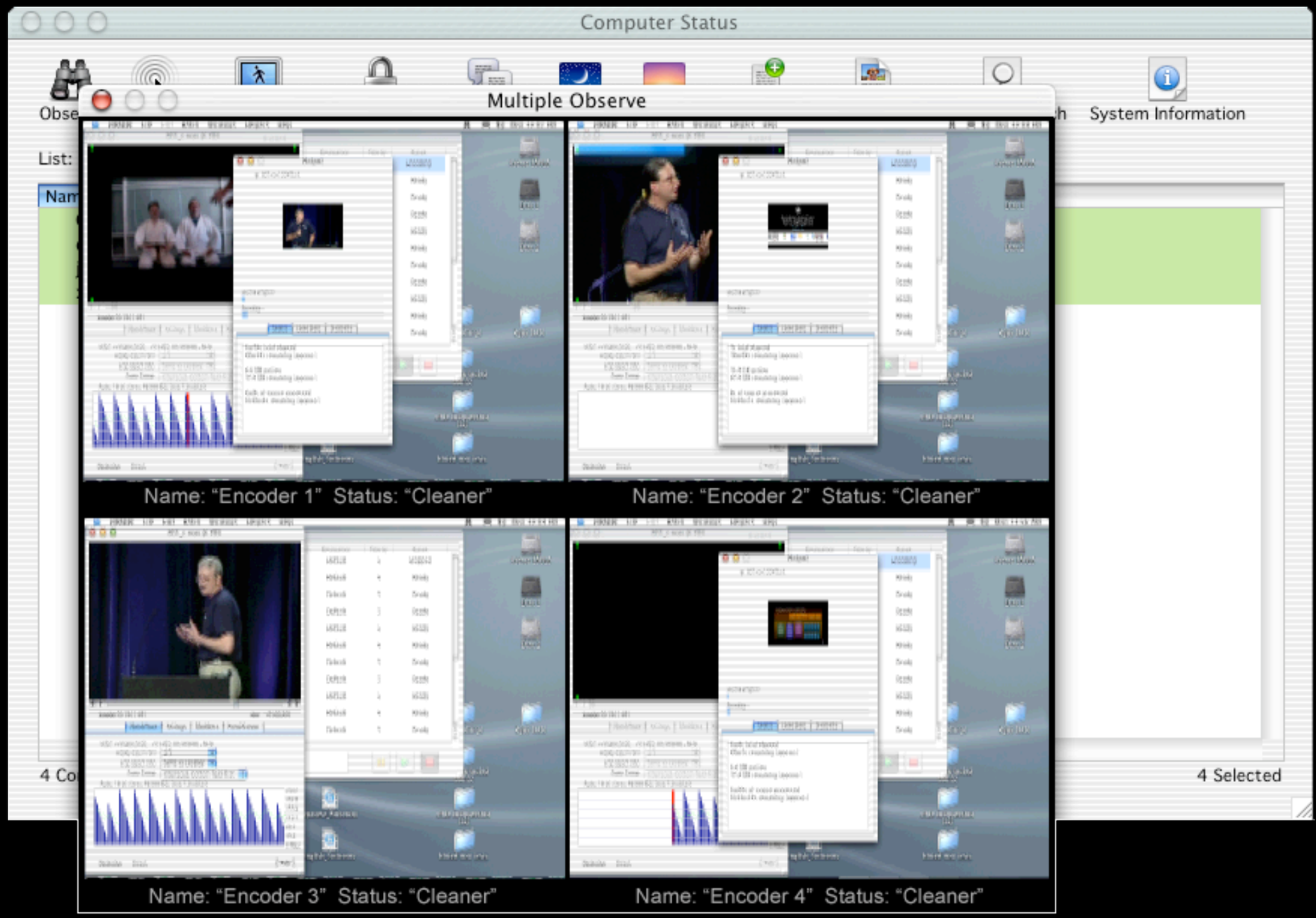
Encoder Monitoring

Automatic notification via Whistle Blower



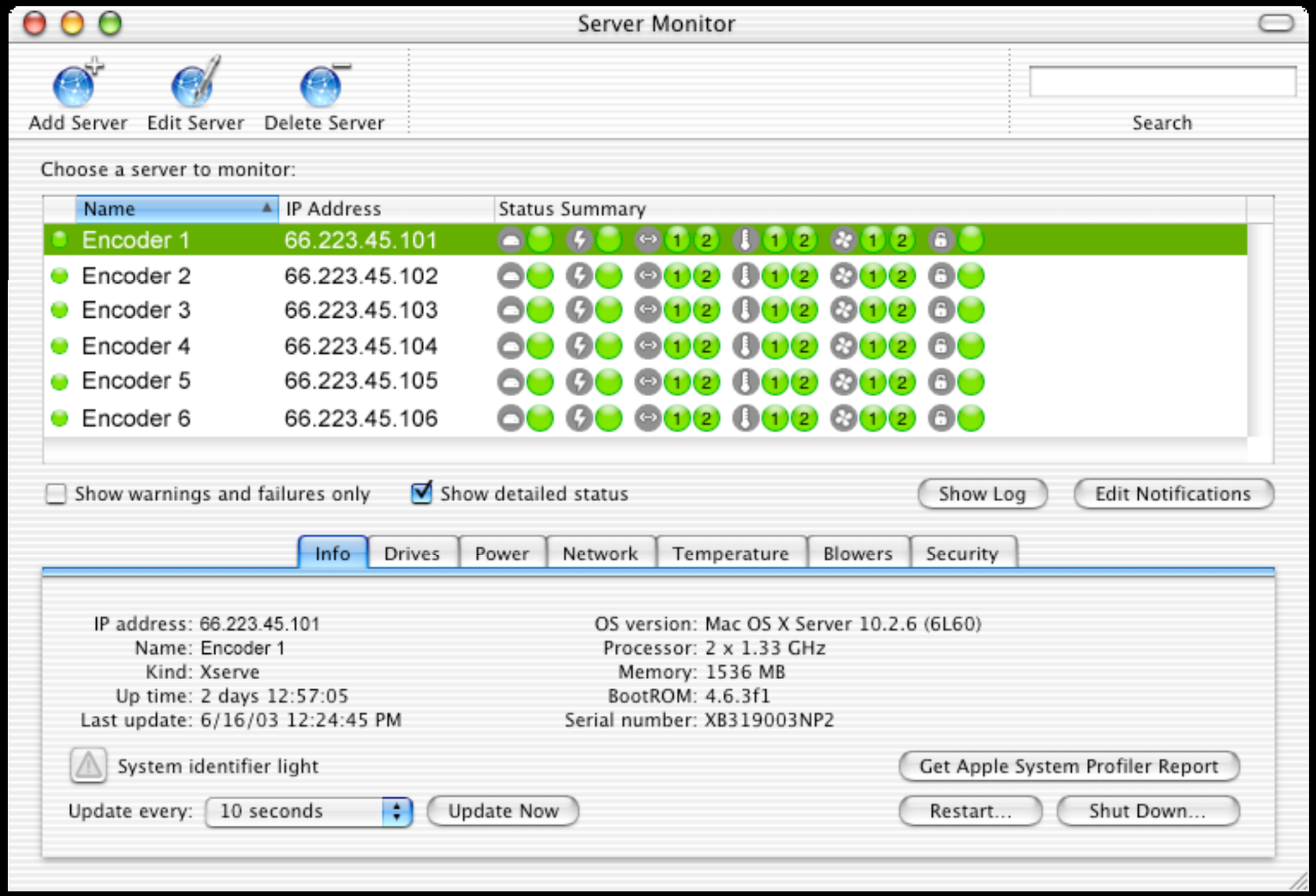
Encoder Monitoring

Remote control via Apple Remote Desktop



Encoder Monitoring

General health via Server Status



Assembly Process

Automation via AppleScript

- Exports from encoders
  - Uploaded to central repository
  - Japanese and DVD movies are built in QuickTime Player
  - Process is automated and logged using AppleScript
    - Scripts do the following:
      - Assemble from individual files or folders of files
      - Check for possible errors during encoding
      - Add annotations
      - Hint streaming versions
      - Set flags for language alternates in DVD-ROM versions

Demo

AppleScript Automation

The Final Stages

Powerfile R200 (archiving)

Repository

Filemaker 6 Server

Assembly 2

Asanté switch

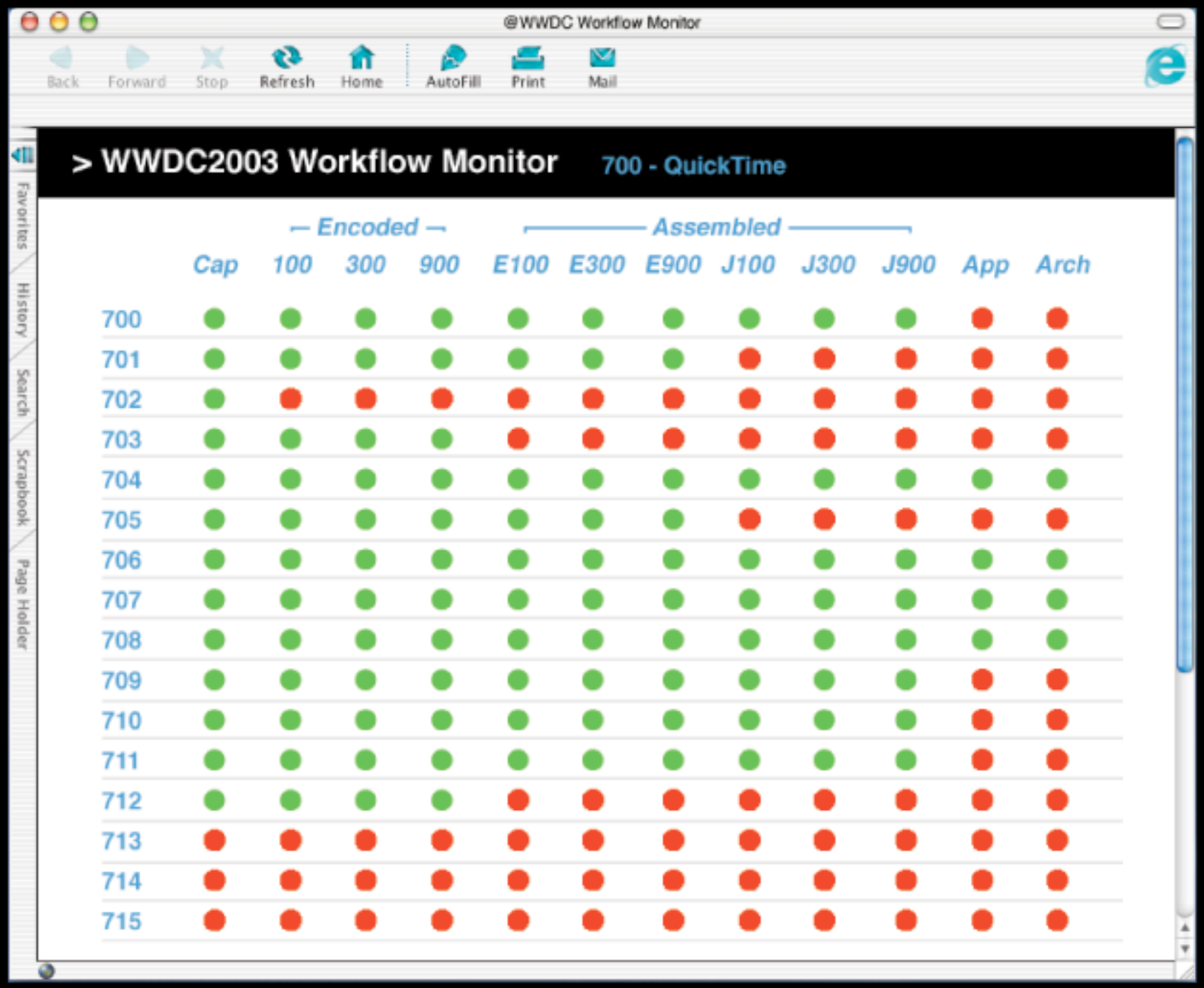
QTSS

Assembly 1

SliMP3 Server

Workflow Monitor

Browser-based progress assessment



Review Process

Browser-based quality control with Filemaker 6

Review Process

Browser-based quality control with Filemaker 6

- Allows quality control staff to review all movies
- Reviewers can be inside or outside firewall, office, or home
- Enables reviewer to provide text feedback
- Enables reviewer to accept or reject a movie
- ‘Admin mode’ for posting new content, receiving feedback
- Speeds up review process significantly

Demo

Filemaker 6 Database

The Complete System

Four Full Work Units

Capture and Encode

Assemble, Review, and Archive

Wrap Up

Roadmap—Thursday

	The Mission	Haight/ Ashbury	SOMA
9:00		723 The Real Story About MPEG-4 Visual Licensing	724 What's New With QuickTime VR?
10:30		725 QuickTime and Enhanced CDs	726 Cutting-Edge Projects Using QuickTime VR
12:00			
2:00	727 QuickTime Streaming Server Programming	728 Produce a Listening Party With QuickTime	729 Industrial-Strength Encoding
3:30		FF011 QuickTime Feedback Forum	
5:00			

Moved *to* Marina

Roadmap—Friday

	Pacific Heights	Haight/ Ashbury
9:00		
10:30	730 QuickTime Alternative Programming Environments	
12:00		
2:00	731 Internet Application Development: The New Frontier	
3:30		
5:00		

Who to Contact

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http://developer.apple.com/wwdc2003/urls.html

For More Information

Documentation

General Information

http://www.apple.com/quicktime

Developer Information

http://developer.apple.com/documentation

QuickTime Information

http://developer.apple.com/QuickTime

Do Not Miss!

Lab: QuickTime Content Creation

Meet with QuickTime content experts for daily content specific topics that are of special interest to you. Bring your own media and Powerbook. No appointment is needed—first-come, first-served.

Sacramento Room

Lab: QuickTime Development

Meet with Apple's QuickTime engineers. Each day will emphasize a specific QuickTime development topic. Bring your own code and Powerbook. No appointment is needed—first-come, first-served.

Sacramento Room

Lab Hours

Monday	12:00pm to 6:00pm
Tuesday	9:00am to 6:00pm
Wednesday	9:00am to 6:00pm
Thursday	9:00am to 4:30pm
Friday	9:00am to 6:00pm

Q&A

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http://developer.apple.com/wwdc2003/urls.html

WWDC 2003

Worldwide Developers Conference